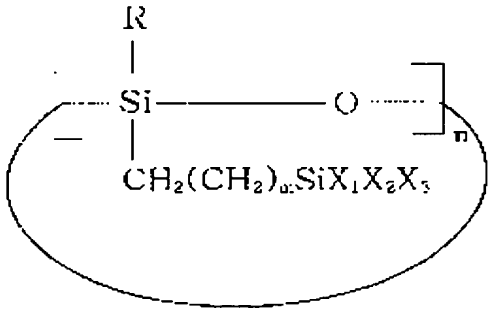
**WHAT IS CLAIMED IS:**

1. A siloxane-based resin prepared by hydrolyzing and polycondensing monomers (a), (b) and (c) in an organic solvent in the presence of a catalyst and water, wherein monomer (a) is a cyclic siloxane compound of formula (1), monomer (b) is a silane compound of formula (2), and monomer (c) is a silane compound of formula (3):

**Formula (1)**




[in which,

R is hydrogen atom, $C_{1-3}$ alkyl group, $C_{3-10}$ cycloalkyl group or $C_{6-15}$ aryl group;

each of $X_1$, $X_2$ and $X_3$, independently, is hydrogen atom, $C_{1-3}$ alkyl group, $C_{1-10}$ alkoxy group or halogen group, provided that at least one of them is $C_{1-10}$ alkoxy group or halogen group;

m is an integer from 1 to 10; and

n is an integer from 3 to 8];

**Formula (2)**

$R'SiX_1X_2X_3$

[in which,

R' is hydrogen atom, $C_{1-3}$ alkyl group, $C_{3-10}$ cycloalkyl group or $C_{6-15}$ aryl group; and

each of $X_1$, $X_2$ and $X_3$, independently, is $C_{1-10}$ alkoxy gruop or halogen group]; and

**Formula (3)**

$R''SiX_1X_2X_3$

[in which,

R" is $C_{1-3}$ alkyl or aryl group including fluoro, phenyl or cyano substituent; and

each of $X_1$, $X_2$ and $X_3$, independently, is $C_{1-10}$ alkoxy group or halogen group].

2. The siloxane-based resin according to claim 1, wherein the monomer(c) is selected from the group consisting of 3,3,3-trifluoropropyl trimethoxy silane, phenethyl trimethoxy silane and cyanoethyl trimethoxy silane.

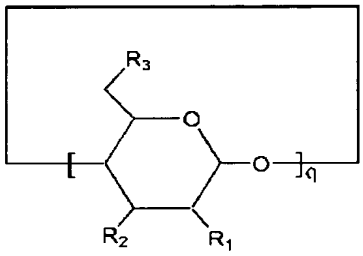
3. A method of forming an insulating film between interconnect layers of a semiconductor device, the method

comprising the steps of: dissolving a siloxane-based resin according to claim 1 in an organic solvent to provide a coating composition; coating a substrate with the coating composition to form a coating film; and curing the coating film by heat.

4. The method according to claim 3, wherein the coating composition further comprises one or more porogen(s).

5. The method according to claim 4, wherein the porogen is cyclodextrin of formula (4) or a derivative thereof:

**Formula (4)**




[in which,

q is an integer of 6-12;

each of $R_1$, $R_2$ and $R_3$, independently, is halogen atom, $C_{0-10}$ amino or azido group, $C_{3-20}$ imidazole or pyridine group, $C_{1-10}$ cyano group, $C_{2-10}$ carbonate group, $C_{1-10}$ carbamate group or a functional group represented by -$OR_4$ (wherein $R_4$ is hydrogen atom, $C_{2-30}$ acyl group, $C_{1-20}$ alkyl group, $C_{3-10}$ alkene group, $C_{3-20}$ alkyne group, $C_{7-20}$

tosyl group, $C_{1-10}$ mesyl group, $C_{0-10}$ phosphorus group, $C_{3-10}$ cycloalkyl group, $C_{6-30}$ aryl group, $C_{1-20}$ hydroxyalkyl group, carboxy group, $C_{1-20}$ carboxyalkyl group, glucosyl group, maltosyl group or Si compound represented by $Sir_1r_2r_3$, wherein each of $r_1$, $r_2$ and $r_3$, independently, is $C_{1-5}$ alkyl, $C_{1-5}$ alkoxy or $C_{6-20}$ aryl group)].